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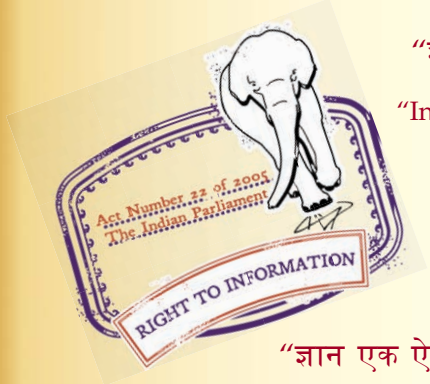
IS 10587 (1983): Terminology for screw threads [PGD 20: Engineering Standards]



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"Knowledge is such a treasure which cannot be stolen"

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Indian Standard

TERMINOLOGY FOR SCREW THREADS

Screw Threads Sectional Committee, EDC 70 [Ref : Doc : EDC 70 (3403)]

1. Scope — Covers the terms and definitions, applicable to parallel screw threads with profiles (in an axial plane) based on triangles.

2. Geometrical and General Terms

2.1 *Helix* — A curve on a right, circular cylindrical surface, intersecting the generators of the surface at constant angles other than 0 or $\pi/2$ radians (*see* Fig. 1).

Note — The axis of the cylindrical surface is also the axis of the helix. If the cylindrical surface is cut along a straight line generator and then developed flat onto a plane, the helix will appear as a number of inclined, straight, parallel lines.

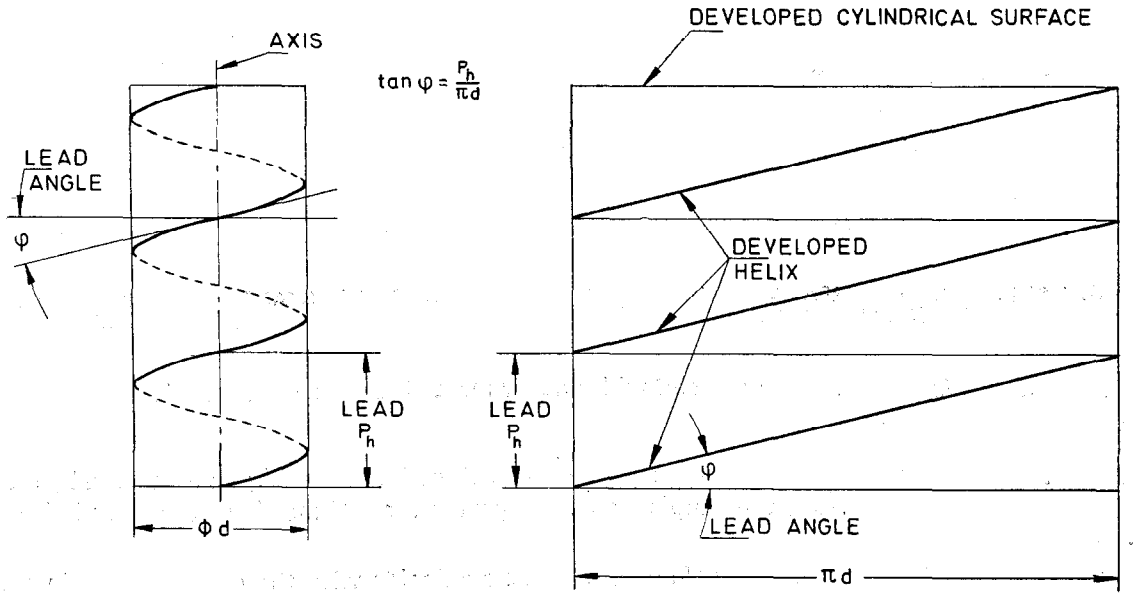

FIG. 1 HELIX

2.2 *Lead of a Helix* — The axial distance P_h (*see* Fig. 1) between two consecutive points of intersection of a helix by a straight line generator of the cylinder on which it lies (the axial movement of a point following the helix one turn around its axis).

2.3 *Lead Angle of a Helix* — The acute angle φ (*see* Fig. 1) between the tangent of a helix and a plane perpendicular to the axis of the cylinder on which it lies (the angle whose tangent is equal to the helix lead divided by the circumference of the cylinder on which the helix lies).

$$\tan\varphi = \frac{P_h}{\pi d}$$

Note — The terms cylinder and cylindrical surface, when used in the following definitions, stand for right circular cylinder, and right circular cylinder surface respectively.

2.4 *Screw Thread* — A continuous and projecting helical ridge of uniform section on a cylindrical surface.

Note — In fact, every point on a thread follows its own helix. All the helices have a common axis, the thread axis, and the same lead, but the tangent of the lead angle is inversely proportional to the radial distance from the helix to the axis.

2.5 *External Thread (Bolt Thread)* — A screw thread formed on the outside of a cylindrical surface (*see* Fig. 2).

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2.6 *Internal Thread (Nut Thread)* — A screw thread formed on the inside of a cylindrical surface (*see* Fig. 3).

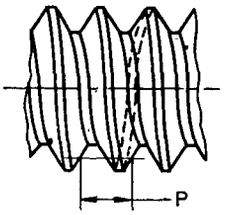

FIG. 2 SINGLE-START THREAD WITH RIGHT-HAND EXTERNAL THREAD

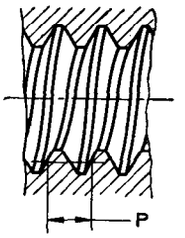

FIG. 3 SINGLE-START THREAD WITH RIGHT-HAND INTERNAL THREAD

2.7 *Right-Hand Thread* — A screw thread that is screwed in or on clockwise (*see* Fig. 2 and 3).

2.8 *Left-Hand Thread* — A screw thread that is screwed in or on counter-clockwise (*see* Fig. 4).

2.9 *Single-Start Thread* — A screw thread with only one thread (*see* Fig. 2, 3 and 4).

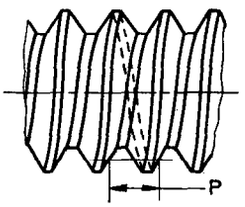

FIG. 4 SINGLE-START THREAD WITH LEFT-HAND EXTERNAL THREAD

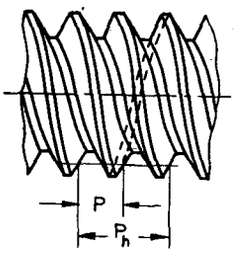

FIG. 5 TWO-START THREAD WITH RIGHT-HAND EXTERNAL THREAD

2.10 *Multi-Start Thread* — A screw thread with two or more threads (*see* Fig. 5).

3. Terms Relating to Screw Thread Elements

3.1 *Basic Profile* — The theoretical profile of the screw thread in an axial plane defined by theoretical dimensions and angles. As an example the basic profile for ISO metric screw threads is shown in Fig. 6.

3.2 *Fundamental Triangle* — A triangle whose corners coincide with three consecutive intercepts of the extended flanks of the basic profile. As an example the fundamental triangle for ISO metric screw threads is shown in Fig. 6.

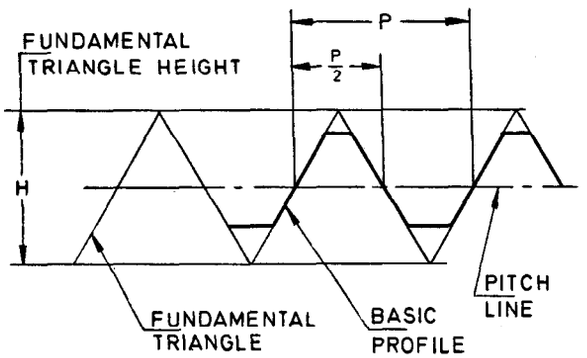

FIG. 6 FUNDAMENTAL TRIANGLE AND BASIC PROFILE

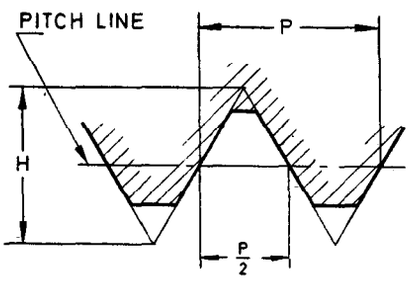

FIG. 7 DESIGN PROFILE FOR INTERNAL THREAD

3.3 *Design Profile* — The shapes of the external and internal threads in relation to which the limits of dimensions are applied. For internal threads the design profile coincides with the basic profile (*see* Fig. 7). For external threads the design profile differs from the basic profile because of the rounding of the root (*see* Fig. 8).

3.4 *Fundamental Triangle Height, H* — The height of the fundamental triangle is a function of the pitch *P*. Various constant functions of *H* describe the complete thread outline (*see* Fig. 6).

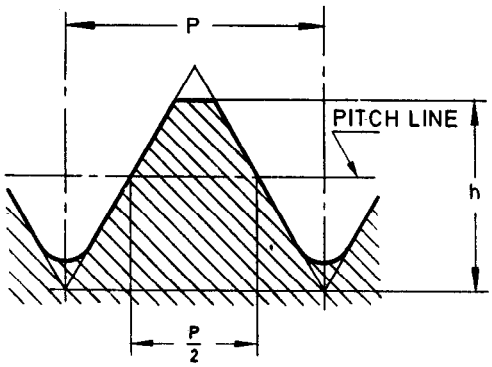

FIG. 8 DESIGN PROFILE FOR EXTERNAL THREAD

3.5 *Flank* — The part of the helical thread surface which connects the crest and the root and which is a straight line in axial plane section (*see* Fig. 9).

3.6 *Ridge* — The material portion between two adjacent flanks (*see* Fig. 9).

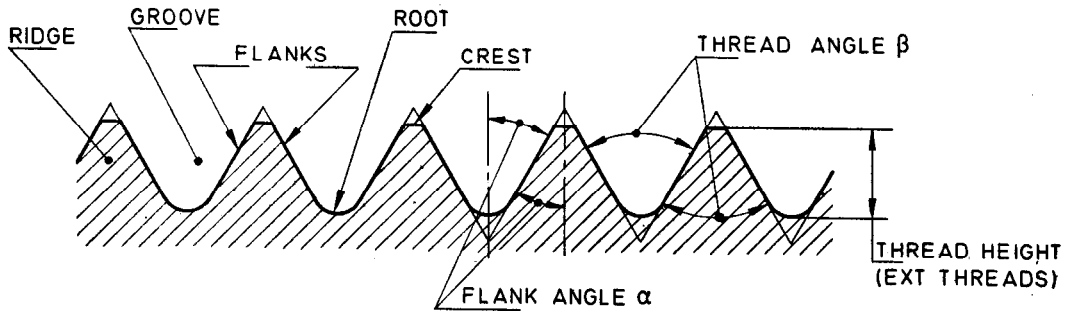

FIG. 9 VARIOUS THREAD ELEMENTS

3.7 *Groove* — The hollow space between two adjacent flanks (*see* Fig. 9).

3.8 *Crest* — The part at the top of the ridge connecting its two flanks (*see* Fig. 9).

3.9 *Root* — The part at the bottom of the groove connecting the adjacent flanks (*see* Fig. 9).

Note — The root is usually rounded.

3.10 *Thread Angle, β* — The angle formed by two adjacent flanks in an axial plane (*see* Fig. 9).

3.11 *Flank Angle, α* — The angle formed by a flank and a perpendicular to the thread axis in an axial plane (*see* Fig. 9).

3.12 *Pitch Cylinder* — An imaginary cylindrical surface cutting a threaded component where the widths of the ridge and the groove of the threads are equal.

3.13 *Pitch Line* — The generator of the pitch cylinder (*see* Fig. 6, 7, 8 and 10).

3.14 *Pitch, P* — The axial distance between a point on a thread of a threaded component and the nearest corresponding point on that component (*see* Fig. 2, 3, 4, 5, 6, 7, 8 and 10).

3.15 *Lead, P_h* — The axial distance between a point on a thread of a threaded component and the nearest corresponding point on the same thread on that component, (the axial movement of a point following its helix one turn around the thread axis) (*see* Fig. 5).

$$P_h = n \times p$$

where n is the number of starts.

3.16 *Major Diameter* — The diameter of an imaginary cylindrical surface bounding the crests of an external and/or the roots of an internal thread (*see* Fig. 10).

Note — Symbol d for external and Symbol D for internal thread.

As a rule, the major diameter is also the nominal diameter of the thread.

3.17 *Minor Diameter* — The diameter of an imaginary cylindrical surface bounding the roots of an external and/or the crests of an internal thread (*see* Fig. 10).

Note — Symbol d_1 for external and Symbol D_1 for internal thread.

3.18 *Pitch Diameter* — The diameter of the pitch cylinder (*see* Fig. 10).

Note — Symbol d_2 for external and Symbol D_2 for internal thread.

3.19 *Lead Angle*, ψ — The acute angle formed by a thread helix on the pitch cylinder and a plane perpendicular to the thread (and cylinder) axis.

Note — $\tan \psi = \frac{P}{\pi \cdot d^2}$ or $\frac{P}{\pi \cdot D^2}$, if there is only one start,

$\tan \psi = \frac{P_h}{\pi \cdot d^2}$ or $\frac{P_h}{\pi \cdot D^2}$, if there are two or more starts.

3.20 *Thread Height* — The radial distance between crest and root of a thread, perpendicular to the axis (*see* Fig. 9).

3.21 *Simple Pitch Diameter* — The diameter of an imaginary cylinder intersecting an actual thread over the width of one groove where that width is equal to one half of the basic pitch (*see* Fig. 11).

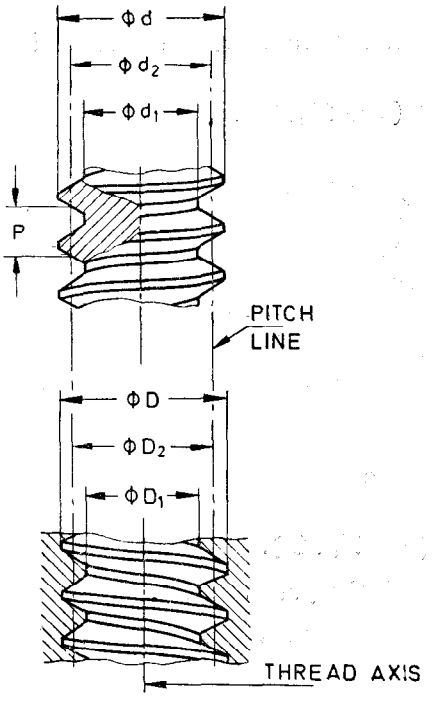

FIG. 10 DIAMETER OF BASIC PROFILE THREADS

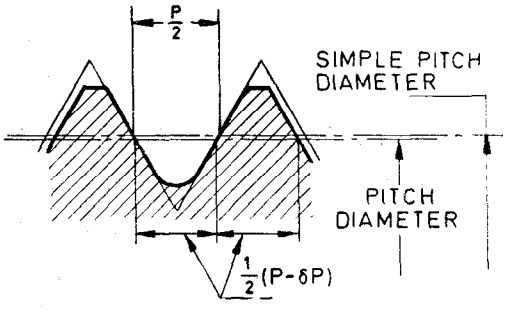

FIG. 11 SIMPLE PITCH DIAMETER

3.22 *Length of Engagement* — The axial distance over which two mating threads (one external and one internal) are in contact with each other (*see* Fig. 12).

3.23 *Virtual Pitch Diameter of an Actual Thread* — The pitch diameter of an imaginary and perfect thread having given basic profile and which would just assemble (without interference or clearance) with the actual thread over a given length of engagement (*see* Fig. 12).

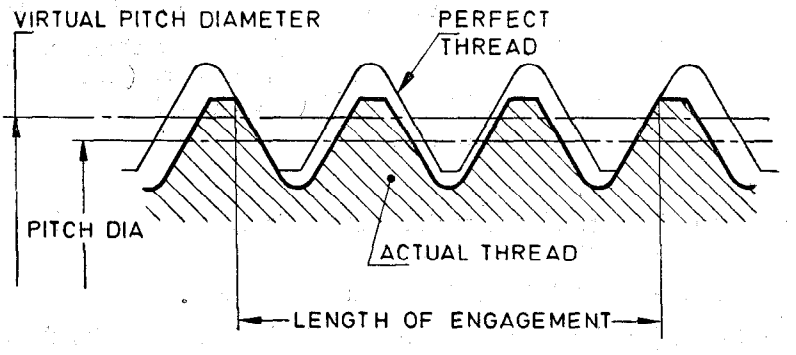

FIG. 12 VIRTUAL PITCH DIAMETER OF ANACTUAL THREAD

EXPLANATORY NOTE

This standard is in full conformity with ISO/DIS 5408.2 'Screw threads-Vocabulary', issued by the International Organization for Standardization.

Printed at Rajkamal Electric Press Delhi